Information Literacy Research: the consolidation of a theme

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Edwards, S. L., Bruce, C. S., & McAllister, L. (2004). "Information Literacy Research: the consolidation of a theme". Paper presented at the Research Applications in Information and Library Studies, 20th September, QUT Brisbane, a pre- ALIA 2004 Conference Event.

Introductory Remarks

For a number of years there appears to have been evidence that a research territory, which may be labelled information literacy is being formed. This idea is based on the premise that information literacy research is constituted by those engaged in the work:

"Information literacy researchers see their research as belonging to the information literacy domain or 'territory', and as they widen the scope of that research they construct the domain" (2000)

Bruce (2000) suggests that the territory of information literacy research may be described in term of five dimensions: 1) the sectoral location of the research, 2) ways of seeing information literacy, 3) what is being investigated – the research object 4) how the object is being investigated – the research approach 5) disciplinary influences. She also suggests likely trajectories for future information literacy research:

- Growth beyond the educational sector
- Attention to a wider variety of cultural settings
- A firmer more consolidated research agenda
- Greater collaboration between researchers
- An agenda driven by funding priorities.

This paper broadly reviews current directions in information literacy research and focuses attention on a range of development in the QUT Centre for Information Technology Innovation (CITI).

Current Information Literacy Research

The following gives a brief overview of recent Information Literacy (IL) research in the Asia Pacific region. This overview is broadly broken up into three sectors; higher education IL research, workplace IL research, and IL research in the community. Within each broad sector the work can be further divided into sub-topics. The research undertaken by the CITI team is included in the subsequent section: Information literacy research in CITI.

IL Research in Higher Education

Much of the research in IL is concentrated on the higher education sector. It includes work that investigates IL in a specific discipline or the IL experiences of university students, the development and evaluation of Higher Education IL programs, IL as a generic skill or graduate attribute and IL as expressed in information seeking behaviour.

IL in terms of a specific discipline or as a specific skill of university students:
Two studies have considered the IL experiences of university doctoral students (Genoni & Partridge, 2000; MacAuley, 2001). Both studies considered aspects of how doctoral students collect, store, retrieve and manage their research data, and also investigated students' supervisory expectations and experiences. Both made recommendations to improve existing IL programs to meet the specific needs of the research students.

The acquisition of specific IL knowledge and skills by university students has also been the focus of attention. Pavey (2003) has found that while both university academic staff and their students have good levels of communication and IT skills, staff are more confident than the students in this area. This latter finding lends weight to a study which indicates that the level of IT skills in first year undergraduate students is variable (Lim & Lee, 2000). Lim & Lee argue that IT training for university students is an urgent necessity in order to satisfy employers graduate skill requirements, and more importantly, to achieve successful learning outcomes when computer use in tertiary institutions is so widespread. Research by Oliver and Towers (Oliver& Towers, 2000) also supports the need for IT training. They found disparity between university and TAFE students' access to and level of skills in using ICTs. The finding that most minority groups are to some extent disadvantaged in terms of ICT access and skills is significant in regard to IL programme development.

Using a cognitive psychology approach, Macpherson (2004) used concept-based teaching methods to teach undergraduate students information searching processes. This approach produced an improvement in the students' knowledge of the search process and in the ability to locate credible literature. The latter potential problem is given further weight in a suggestion by Stern (2003) that a considerable proportion of students do not consider either the quality or the reliability of Internet resources. Another study (Handzic & Lin, 2003) supports the idea that an extended cognitive style perspective on learning may lead to improvements in idea generation, problem solving, and inquiry approaches. Stern has called for the higher education sector to improve their understanding of how students gather information and then devise

curricula to teach students the ways in which information is managed in digital formats.

Development and evaluation of IL programs:
A recent study by Brewer (1999), raises some concerns about the value of IL programs. After implementing a curriculum integrated IL program for undergraduate students a follow-up evaluation, using quantitative and qualitative data, showed that participation in the program had little or no long-term impact on students' searching skills. However, other researchers reporting on evaluation of the implementation of IL programs (Douglas & Murdoch, 1999; Hill, 1999; Hiscock & Marriott, 2003; Holden & Cribb, 2004; Yu, 2004), using research methods varying from surveys and student course evaluation instruments to action research projects, have found clear evidence that while the programs are valuable, improvements to our teaching methods and modes of delivery of these programs are needed (Drew, Abbott, & Orr, 2001; Salisbury & Ellis, 2003). In a study at Macquarie University (Talay-Ongan, Edmonds, & Gosper, 2001), which gave clear evidence that the integration of IL programs into course assessment and task design led to a more relevant and highly successful learning experience, concern was raised that this integration should not be done "at the expense of scaffolding necessary for the unit content, learning processes and assignments".

There have also been reports on studies that have considered the effectiveness of how librarians and academics, or researchers, work together for IL programs (Ivey, 2002; Smith & Martina, 2004; Tucker & Palmer, 2003). It appears that the challenge for the academic community, and the librarians who work together with them, is to ensure that the skills taught in IL programs are relevant, regularly repeated, well publicised, have sound instructional design and relevant modes of delivery, and are extended into all areas of the curriculum (Hartmann, 2001; Turnbull, Frost, & Foxlee, 2003; Wallace, Shorten, & Crookes, 2000). Hartmann particularly found that while student learning is influenced by their previous experiences they will engage with IL programs as a "subject matter only to the extent that they perceive lecturers and tutors require them to". They also raised serious questions about students' abilities to seek and use information.

Student information seeking and behaviour in context:
Various studies are attempting to understand university students' information seeking behaviour and use. Cunningham (2003) has suggested that the design of music digital libraries could benefit from studying the music public's information behaviour shown in music stores and public libraries. Klaus used phenomenography (2000) to reveal users' understandings of how the thesaurus is conceived in the process of searching indexing and abstracting services. This study speculates on the importance of including thesauri as pivotal elements in IL programs in higher education.

Another phenomenographic study by Parker (2001), found that while student learning and information behaviour is probably closely related, "their relationship has been framed by a narrow interpretation of 'information' in the higher education literature and considered beyond the scope of Information Science". Parker researched students completing assessment tasks aiming to understand the complexity of the interaction between learning and information and suggests this is an area needing further research.

The use of phenomenography and critical incident technique, as a means of identifying individual experiences thought processes and feelings of subjects, acknowledges the holistic nature of the information related experience. It should therefore impact on the nature of information literacy teaching/training/programs since it will demand, of the T&L design, the reflective dimension where students can begin to understand their own thoughts/feelings processes. If the holistic nature of experiences is made explicit by the research methods used in IL research, then this dimension should necessarily inform subsequent curriculum/program/T&L design.

IL as a generic skill or graduate attribute:
Some work has been done on integrating IL as part of the overall curriculum in either the university as a whole, or embedded as part of a specific course. Abbott & Peach (2000) provide an overview of the work at Griffith University to integrate and further develop IL as a generic attribute in the curriculum. Similar work at Curtin University is documented by Briguglio (2000). While Patrick & Crebert (2004) suggest there is a "need to consider the role of personality or nature as an influence on the perceptions of importance of further development of generic skills". They call for the exploration of strategies to raise awareness of the need for lifelong IL skills.

Finally, in considering students' graduate attributes and their ability to transfer these to the workplace, Yashin-Shaw, Buckridge, & Ferres (2004) suggest that students may be assisted in acquiring an explicit rather than a tacit understanding of graduate attributes and that this understanding may enable students to better represent themselves when seeking graduate employment and be more proficient at transferring their skills in the workplace. This research really fits in either this sector, IL research in higher education, or in the next one, IL in the workplace.

IL Research in the Workplace

Providing evidence of IL research growth beyond the educational sector, recent research in Information Literacy in the workplace focuses on four areas; the need for IT skills in the workplace, the transfer of IL and IT skills from formal education to the workplace, the development of effective IL Workplace Programs, and workplace information use and behaviour.

Transfer of skills from formal education to the workplace: -
As with the last study in the previous sector (Yashin-Shaw et al., 2004), there has been recent research into the transfer of IL skills gained from formal education into practice in the workplace setting. Searle, Dwyer, Jirowong and Hinton (2000) studied nursing graduates and, based on their findings, have called for the introduction of IL workshops in clinical areas, with an increased participation of health librarians in professional development sessions. They have also called for the encouragement of undergraduate students to undertake further collaborative research projects in the clinical and community settings.

Need for information technology skills:
Recent IL research in the workplace also provides suggestions to further improve both IL and IT skills in the curriculum at universities. For example, Lawson & de Martos (2000) examined the experiences of BA graduates to investigate the trends in

demands for IT skills in the workplace and used their findings to explore the implications for future BA degrees.

Unlike other studies in this area, Parboosingh (2000) considered the experience of physicians in practice for 10-15 years, who are unlikely to have been exposed to education which developed skills of self-directed learning and information literacy. However, this study was more in the form of considering the value of a new piece of software aimed to help physicians in their daily practice to allow better information access and organisation. It seems more of an advertisement than true IL in the workplace research.

Development of effective IL programs:
In a study of journalists working with their librarians in the workplace, Bradley (2003) has suggested that "there is a lack of research examining the transition from university/formal learning to the workplace". Bradley proposes that further research is needed into how librarians plan training for journalists, how they can work together to develop training resources, and more work is needed to find out what teaching methods will give the best impact on journalists. Almost in an indictment to IL workplace programs, Bradley suggests that the reasons behind the introduction of IL by librarians needs to be further explored to establish the benefits of such programs in different contexts.

Information use and behaviour in workplace context:
The relationship between individual and organisational information literacy has recently been explored. Bruce (1999) suggests that workplace IL experiences are closely related to the usual workplace processes, such as environmental scanning, information management, corporate memory, and research and development. This area has also been closely investigated by Kirk (1999; 2002; 2004) with findings showing that there are five qualitatively different ways of experiencing information use in the workplace: packaging information, enabling flow of information, developing new knowledge and insights, shaping judgements and decisions, and influencing others. Use of information and information behaviours in specific workplace settings have also been investigated; such as Lloyd's (2004) work with firefighters and a study of university technical support workers (Cunningham, Knowles, & Reeves, 2000).

IL Research in the Community

Further evidence that there is growth beyond the education sector in IL research and an emerging attention to a wider variety of cultural settings is seen in the recent research into IL in the community. While there has been little research to date in IL in the community, the research in this sector focuses on information access, or on the use of communication and IT technologies.

Use of ICT and Information Technology:
Synthesising current statistical reports and other reliable public domain information resources Funston & Morrison (2000) have provided an overview of the use of the Internet and other ICT's in Australian young people. They suggest that while Australia is still a world leader in Internet/ICT use, the 'digital divide' between

information "haves" and "have-nots" is still evident with family status, household income and educational levels being the key determinants.

In a study loosely connected to IL, Hardy (2001) has suggested that a scan of the local authorities efforts in Victoria, Australia, show that many of the organisations are engaged in identifying, organising and redistributing information to their constituency. While Hardy found that there was a high demand for basic tool literacy courses, the report findings suggest that a more sustained approach to professional development of key personnel within the organisations could be an efficient way to develop the information capacity of those community organisations. Hardy further suggests this could be an area for library/community partnerships.

Information access for social action:
This final sub-topic of IL in the community research studies has implications for social justice and action. A study of adolescents' information use in they way they sought and analysed their knowledge about the drug heroin suggested implications for information practice and instructional design to drive the actions in this social problem area (Todd, 1999). Another study into the service implications for the supply of information to blind and sight impaired people showed that resources other than the Internet, such as radio stations, should specifically cater for the blind and vision impaired (Williamson, Schauder, & Bow, 2000). These services are vital to the blind and vision impaired community and, as such, need to be maintained at their current levels.

Finally, in a government initiative, using Women's Advisers from all Australian Governments, from the New Zealand Government, and from the NSW Department for Women, a report was commissioned to Urbis Keys Young to undertake research to examine women's information needs and information-seeking behaviour in relation to government information (Urbis Keys Young for NSW Department for Women, 2002).

Clear evidence has been found of growth in IL research beyond the educational sector. Research into IL in the workplace is growing and some evidence that cultural settings and community are now beginning to be considered. This completes the brief overview of recent research in the field of IL in the Asia and Pacific region. The next section overviews the IL research work in CITI.

Information literacy research in the Centre for Information Technology Innovation (CITI)

CITI is one of two research centres of the Faculty of Information Technology at QUT. For many years members of the centre interested in matters associated with information analysis and literacy have been part of a research subgroup called the Information Systems Management Research Group (ISMRG). The group has a number of scholars whose research relates to IL. Christine Bruce completed her doctorate with this research focus (Bruce, 1997) and Sylvia Edwards and Helen Partridge are nearing completion of their doctorates in the area. Gillian Hallam, Neville Meyers and Karen Nelson though completing doctorates in other areas, have research interests associated with IL, as does Michael Middleton who is pursuing

doctoral research in areas of information management influenced by IL. In addition, there are also several research students investigating areas of IL. The research centre is presently working through a restructuring of its research areas around a series of macro themes.

In the preceding section IL research has been divided into three sectors, IL in the higher education, workplace and community sectors. This is also an accurate description of the work in the CITI group (Figure 1). Using these sector headings each CITI project is described by presenting the aims and the research method, which includes a brief method explanation. Each project description concludes with identification of likely outcomes.

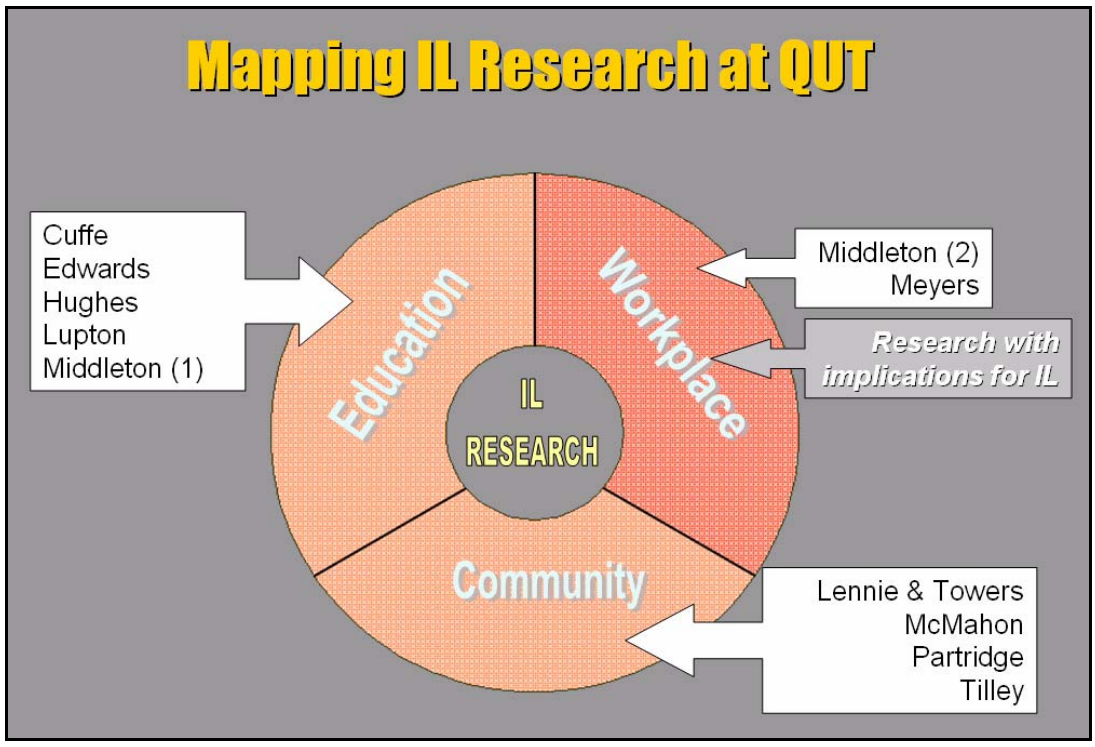

Figure 1: Mapping Information Literacy Research at QUT's CITI

CITI - IL Research Projects in Higher Education

Natalie Cuffe has recently completed research in the area of *Legal Information Literacy – student experiences and the implications for legal education curriculum development* (Cuffe & Bruce, 1999). The project aims to contribute to current understandings of information literacy in the legal education context; in particular to examine the extent of law students' use of information and information technology, their success rates with using information and information technology and their views on the place of legal research and information literacy education.

The research method: A written survey was administered to final year law students at three Brisbane university law schools. The survey included a research problem that focused on common legal research tasks involving Australian law that was designed to test the students' perceptions of their success rates in a range of information and information technology activities and to provide common

information about student legal research ability that could not be provided by individual university assessment results.

Outcomes and Application: The primary outcome of this survey is a picture of law students' present experiences with information and information technology previously unavailable to legal educators. In particular, the results of the survey show that, despite the rich information and information technology environment in which law students undertake their tertiary studies and the high level of skills training, present legal curricula do not seem to have succeeded in the task of educating students in effective information problem solving that is critical in legal practice.

The results of the research reveal a picture of law students' present experiences with information, information technology and legal research of interest to legal educators in reviewing legal curricula to foster information literacy and lifelong learning. This has prompted the development of a curriculum model that inculcates these educational imperatives and shifts the paradigm from legal research training to legal information literacy education.

Mandy Lupton is currently undertaking a research project on *Information literacy and learning* (Lupton, 2003a, 2003b, 2004). The project aims to investigate later-year undergraduates' ways of experiencing information literacy in particular disciplinary contexts, in order to develop a model of the relationship between information literacy and learning. The research questions are:

- What is the relationship between information literacy and learning?
- What are the generic and situated aspects of information literacy?

Research Method: The investigator is seeking to uncover the variation in students' experiences therefore phenomenography is used as it is a suitable research approach and theoretical framework for investigating difference of experience. Phenomenography is an interpretative research approach for "mapping the qualitatively different ways in which people experience, conceptualise, perceive, and understand various aspects of, and phenomena in, the world around them" (Marton, 1986). Phenomenography has been primarily used as a research approach in education, and more recently in information literacy (Bruce, 1997; Limberg, 1998; Lupton, 2003a, 2004). Phenomenography looks at the relation between the person (subject) and the part of the world in question (object) (Marton, 2000). It describes the variation and meaning behind the way in which people experience a phenomenon. The outcome of a phenomenographic inquiry is the identification of the different ways people experience a phenomenon and the structural relationships between these different ways of experiencing.

Information gathered through semi-structured taped interviews with third and fourth year students in two disciplines at Griffith University will form the data source. In line with a phenomenographic approach, a purposive sample will be chosen for maximum variation. The interview questions will illustrate the different aspects of learning and information literacy to be investigated:

- Learning through doing the assignment (learning about the topic)
- Learning through doing the unit (learning about the discipline/field)
- Learning information literacy (learning about finding and using information)
- Learning in general

Outcomes and Application: The study is likely to have an impact in four primary areas. Firstly, it will make a substantial contribution to the understanding of the relationship between information literacy and learning. Through investigating the experiences of later year students it will contribute to a more complete mapping of the experience of information literacy in higher education Secondly, it will make a methodological advance in terms of empirically investigating relationships between two related phenomena. Thirdly, it will offer strategies for teachers in higher education (academics, librarians and learning skills advisors) regarding curriculum design for information literacy education. Lastly, it will inform policy makers, administrators, academics, librarians and learning skills advisors about the nature of information literacy as a generic skill and graduate attribute.

Hilary Hughes' (2004) Information Literacy research project concerns the experiences of international students' use of online tools and resources. The aim of this project is to gain a deeper understanding of international students' experience in using online resource and tools. In particular, the research seeks answers to the following questions:

- How do international students use online resources and tools for study?
- Do international students experience difficulties in their use of online resources and tools that are attributable to linguistic or cultural differences?
- What information literacy strategies are needed to assist international students overcome these difficulties?
- How could online resources and tools be improved to facilitate their use by international students?

Research Method: Critical Incident Technique (CIT), a qualitative research method developed in the 1940s by John Flanagan (Flanagan, 1954), provides the methodological framework for this project. The main reason for adopting CIT is its ability to focus on individual experience in a real-life context. Its efficacy, validity, and ability to handle large volumes of data have been attested in hundreds of studies across a variety of disciplines including information science and education. CIT was originally designed as behaviourist tool, but in common with other subsequent researchers, the current researcher has adapted – or rather expanded - some aspects to widen the perspective, from the purely behavioural, to incorporate affective and cognitive facets of participants' experience.

Through purposeful sampling, the researcher has recruited a culturally and linguistically diverse group of international students – a mix of undergraduates and postgraduates in their first year of study at CQU Brisbane International Campus. Data was collected through semi-structured interviews, and observation of a set task that required participants to search the internet, a journal database and the CQU Library's online catalogue. Although the combination of two data collection methods was not a feature of early CIT studies, it is believed triangulation will enhance the value and credibility of the results.

In accordance with Critical Incident Technique, data analysis for this project centres on the identification and categorisation of 'critical incidents' from which a picture of 'critical behaviours' relating to the participants' online use can be drawn. Since the purpose of the research is to foster understanding of the participants' whole

experience, the term 'critical incident' has been defined broadly to include participants' thoughts and attitudes, in addition to their actions, associated with online use. As a result, the findings will not be limited to a set of behaviours, the outcome of 'traditional' CIT studies; instead they will constitute a thematic presentation that interweaves participants' actual online use with their individual and cultural attributes set in the context of international education. The cross-cultural nature of this project adds complexity to its design and execution, especially with regard to recruitment of participants, data collection and data analysis.

Outcomes and Application: It is hoped the research project will lead to a greater understanding of international students' online experience. This greater understanding of their experience and the difficulties encountered may then be applied to a range of areas including: the development of information literacy curriculum and strategies, improvements in information retrieval software and web usability, and internationalisation of software. Benefits – in terms of enhanced online experience & learning outcomes - may extend beyond international students to the wider student population, which is becoming ever more culturally and linguistically diverse and dependent on ICT for learning.

Sylvia Edwards has recently completed a phenomenographical study of tertiary students' experiences with web-based information searching (Edwards, 2000, 2004, in press, 2004; Edwards & Bruce, 2002a, 2002b, 2002c, 2003, 2004). The research project – *Web-based information searching: understanding the experience* - was based on previous research findings and on teaching observations. In broad terms, the project aimed to determine variations in QUT students' web-based information searching experiences. Specific aims of the project were:

- To determine variation in the ways students approach information searching when using the Internet and library databases.
- To determine variation in ways of learning to search for information when using the Internet and library databases.
- To recommend teaching and learning strategies for curriculum design that is based on managing student's experiences.
- To determine if there are levels of sophistication in information searching or other differences in information searching behaviour approaches.
- If levels do exist, to identify any triggers to move from one level of searching sophistication to another level.

Research Method: As the research aimed to make sense of the students' understanding of the information searching and retrieval concepts and understand their approaches to learning to search, a phenomenographic approach was used (Bowden & Walsh, 2000). Phenomenography, is an interpretive research approach, which looks at the different ways people experience or conceive a range of phenomena (Marton, 1988). In simple terms it is a way to describe how things appear to people (Marton & Pang, 1999).

Phenomenography aims to uncover the variations in an experience and describes these variations as a finite set of categories. These categories reveal the space of the variation, or, the various ways of seeing information searching. Having found the variations, we can use them to identify ways to encourage students to discern another aspect of the information searching experience, an aspect they have previously not

discerned. We can structure the learning environment to ensure students experience the variations of the information searching experience. By doing so, we may encourage learning.

Outcomes and Application: The structure of awareness of the four categories identified has revealed variation in the experience of information searching. The four categories of experience are:

- Information searching is seen as looking for a needle in a haystack.
- Information searching is seen as finding a way through a maze.
- Information searching is seen as using tools as a filter.
- Information searching is seen as using tools as a filter to limit results to high quality information.

Students, in some experiences, are frozen in their ability to find information as they see through a haystack or a maze when they attempt searching. This lens hampers their ability to use the information environment more effectively. Aspects of the search tool features and the information environment are, to some, at best a hazy image, and at worst, an aspect clearly misunderstood. When teaching information searching skills, then, what could be done? Clearly, we need to encourage students to discern another information searching experience. There are four areas which could be considered here - provide students or other information searchers with opportunities for reflection; improve exercises used to encourage searchers to see the variation; use and explore the online tools to further enhance the learning experience; and finally, encourage staff development to enable understanding and application of the findings.

Michael Middleton has begun a project which, although not focused upon IL, does have relevance to, and implications for it. This research – *Library support for online education* - involves investigation of the effective provision of remote online library services in tertiary institutions. There is a research assumption that many library users undertaking courses now make use of digital services irrespective of whether they are undertaking distance education courses.

A preliminary literature review has identified relevant areas of study, each of which is a factor in effective off-campus education. Four of these: the institutional framework, management of courses, utilisation of delivery media and teaching and learning effectiveness are of interest to the study for the influence they have on the fifth area which is provision of supporting services.

The research is endeavouring to establish a model for effective delivery of such services. It is therefore in the process of identifying elements of services presently being offered by libraries in an online educational framework, and discovering why they have developed in this way.

These supporting services are being examined to identify those elements that are presently being adopted in the Australian academic environment, and so investigating the questions:

- What are the elements of services presently being offered by libraries in an online educational framework, and why have they developed in this way?

- Which of these elements are presently being adopted in the Australian academic environment?
- What do managers who are presently providing these services regard as effective performance indicators?
- How effective do learners who are using the present services consider them to be?
- How would learners like to see libraries support their learning in a digital environment?

Research Method: A mixed method approach has been chosen for this research project. The project incorporates a case study and uses survey method to gather data from both service providers and students. A preliminary scoping survey has been conducted through the Council of Australian University Librarians. This will be followed up with a more detailed survey of chosen institutions identified in the initial survey. Students from the case study site will be surveyed.

Outcomes and Application: A description of case studies of representative services is likely to expand understandings by providing rich information on the current state of online library service delivery. In addition to providing a situational analysis of library support for remote users, the research is expected to provide a model for effective continuing provision and development of such services.

CITI - Information Literacy Research in the Workplace

The second area of research being undertaken by **Michael Middleton** – *Information management: formation of a discipline* has some connection with Information Literacy in the workplace. It involves the study of discipline formation in information management. The research seeks to answer the following questions:

- Can a discipline area for information management be articulated?
- Is it possible to harmonise information management concepts across competing disciplines?
- Has such a discipline been employed in the establishment of computer-based information services?
- Do the areas of agreement among practitioners constitute a discipline formation?

The work includes an exploration of whether information management can be articulated as a discipline involving the application of information science. It currently involves investigating scientific and technical information (STI) service development in Australia, by means of the case study and interview, for its contribution to the development of information management. An aspect of information management is the application of Information Literacy in a corporate context. Education for information use is a significant aspect of planning for effective application of information management in business and government.

Research Method: A case study approach has been chosen for the project. Multiple case studies involving STI services managed by organisations including CSIRO, National Library of Australia, The Australian Mineral Foundation and

Australian Road Research Board, are to be undertaken. The interview method is being used to gather information. Semi-structured interviews are to be carried out with managers, retired managers and previous managers who have moved to other roles. This is being complemented by archival research.

Outcomes and Application: The initial outcome of this project is the publication of a book that consolidates the aspects of IM - *Information management: A consolidation of operations analysis and strategy* (Middleton, 2002). The research will contribute to current understandings of scientific and technical information service genesis and development in Australia and will provide a task analysis of information management practitioners.

The development of programs, that incorporate learning about application of information and knowledge systems in the workforce, for those who are not information specialists. This is an important factor in preparation for employment.

CITI - Information Literacy Research in the Community

Information Literacy research projects are currently being carried out in the community sector by four of our presented researchers.

Helen Partridge is concerned with *Establishing the human dimension of the digital divide* (Partridge, 2002a, 2002b, 2003, 2004). The aim of this research is to explore the human dimension of digital inequality by examining the psychological factors that contribute to digital divide. The research is focused by the basic question: are there internal forces causing members of community to choose not to integrate information and communication technology, such as the Internet, into their lives? The main aim of the research is to explore the notion of the Social Digital Divide proposed by Harper (Harper, n.d.) by examining the Internet self-efficacy of Internet users and non-users within the community. This is to be achieved by:

- Measuring the Internet self-efficacy of Internet users and non-users.
- Determining if there is a difference in Internet self-efficacy between:
    - Internet non-users users who represent the "Socio-economic Digital Divide" or as proposed by Harper (Harper, n.d.) the Access Digital Divide;
    - Internet non-users who do not represent the "Socio-economic Digital Divide" but who may represent the Social Digital Divide as proposed by Harper;
    - Internet users who are not considered to be part of the digital divide.

Research Method: This research will examine the internal or psychological forces that motivate an individual to refrain from integrating technology, such as the Internet, into their lives. To achieve this end, the research is underpinned by the Social Cognitive Theory (SCT) developed by Albert Bandura (1986). Self-efficacy is a major component of the Social Cognitive Theory. Bandura (1986) describes self-efficacy as "people's judgments of their capabilities to organise and execute courses of action required to attain designated types of performances" (Bandura, 1986).

Self-administered surveys will be used in data gathering. The survey instrument will consist of three sections: The first section seeks information on demographic details

such as gender, age, employment status, income level and education level. The second section gathers data on the participants' Internet Use. Data gathered included where they obtain access to the Internet, length of involvement with the Internet, self-perception of Internet skill and frequency of Internet use. The third section will gather data on the participants' level of Internet self-efficacy.

Surveys are one of the most widely used data gathering techniques. Surveys have been employed in a wealth of disciplines including the social sciences, law, business and library and information studies. Self-administered surveys have the advantage of being cost effective, being simple to administer and providing data which is easy to collect and analyse. Self administered surveys are an appropriate choice for the current study because of the general suitability for investigating research questions about self-reported beliefs or behaviours (Neuman, 2001).

Outcomes and Application: This research is significant because it develops a new theoretical framework through which to view the division between information 'haves' and information 'have-nots' within society. The research will illustrate that the digital divide involves more than just the availability of resources and funds to access those resources. In addition, this is the first time that Internet self-efficacy has been explored within the context of the wider community. The research will develop an Internet self-efficacy scale that is appropriate for use within the context of the general population.

This research is important because it expands current understanding of a phenomenon that has far reaching social and economic implications. The research will allow a more concise understanding of what is and who represents the digital inequality in society. Developing a clear and comprehensive picture of the forces behind the division in society between 'haves' and 'have-nots' is a vital step in bridging the gap. The research will allow organisations (for example public libraries) involved in the digital divide solution, to develop and tailor services and programs to more accurately and effectively narrow the gap between information rich and information poor. As a consequence real steps can be made in bridging the gap between the 'haves' and the 'have-nots' in society. It will allow for all members of the community to have an equal chance of establishing and maintaining productive personal and professional lives in the rapidly emerging digital age.

Christine Tilley's research project - *A sense of control: a virtual community for Queenslanders with long-term, physical disabilities* – is seeking to develop a theoretical framework for a virtual community for a specific group of people, that is, people with long-term physical disabilities. The research focuses on the central question – How can virtual communities best be facilitated for persons with disabilities? It aims to propose strategies for implementing a virtual community model based on user information needs for Queenslanders with long-term physical or mobility disabilities.

Research Method: The research method, grounded theory, used in-depth interviews with persons with paraplegia, quadriplegia or other severe, long-term physical or mobility disabilities and the health care professionals, service providers, information personnel and policy advisers who were involved in their well-being. Responses enabled the researcher to determine the types of information that persons

with long-term physical disabilities would report about their experiences using Information and Communications Technology [ICT]. Essentially, only one interview question was used in this determination. Details of the various response categories of these interviews with participants, about their perceptions of community information networks and their impact on the community members, were analysed as part of the Grounded Theory constant comparison methodology. Their relationship to the literature was considered. Each interview explored, in detail, the elements and any barriers behind the usage of ICT and/or assistive technology.

Outcomes and Application: The study found that technology itself could provide strategies for independence and thus facilitate self-empowerment. However, the process that gives a sense of control and is empowering, is also capable of being dis-empowering. Empowerment and dis-empowerment are intersecting processes because of digital divide issues and the fact that virtual reality for people with physical disabilities may be a 'double-edged sword'. Based on the new knowledge and the theory as the outcomes of this study, a range of recommendations that have application in the community will be discussed.

Stephen Towers, June Lennie & Christine Bruce are proposing to research Information Literacy issues in the community context. They are aiming to find *New models and methods for evaluating the social and economic impacts and effectiveness of rural information literacy programs*. The advent of the knowledge society has increased the significance of information literacy for educators, businesses, governments and information professionals around the world (Oliver & Towers, 2000). Information literacy enables more effective use of technologies such as computers and the Internet, which is argued to have many benefits for sustainable community and economic development (Mansell & Wehn, 1998; Simpson, Wood, Daws, & Seinen, 2001). However, there are many challenges and issues in the use of information and communication technology (ICT) by rural communities.

While previous research into information literacy programs has focused mainly on primary outcomes for individuals such as increased skills, knowledge and awareness, we argue that a broader context – namely community capacity building and development – is required for rural information literacy research. The proposed project will therefore develop evaluation methodologies that identify indicators of the primary, secondary and tertiary impacts of information literacy programs. The subsidiary objectives of this project are:

- to elicit rich descriptions and identify key indicators of the primary, secondary and tertiary impacts of community capacity building and information literacy programs; and
- to develop strategies and tools for the inclusion of a broad diversity of community members in information literacy programs and in the evaluation of these programs.

Research Method: The research combines participatory action research (PAR) and phenomenographic methodologies. Such a methodological combination has not yet been applied to information literacy research. PAR has been successfully used in a wide range of fields including education, health, community development and agricultural extension (McTaggart, 1991; Wadsworth, 1998). This innovative multiple methodological approach will provide a richer and more complete picture of the

impacts and effectiveness of information literacy programs, compared with the use of participatory evaluation methods alone. This approach allows maximum flexibility and creativity in the research design and implementation. It enables the complexity and richness of evaluation data to be more fully represented and understood from a broad range of perspectives.

This analysis will focus on social and economic impacts on various sub-sections of the selected rural community such as farming families, indigenous people, town-based small business people, youth, NESB and older retired people. Gender, age, ethnicity and other differences will be taken into account. The methodology will enable both intended and unintended impacts and outcomes to be critically evaluated.

Outcomes and Application: A significant contribution of the project will be the development of an innovative methodology and tools to identify and evaluate the secondary and tertiary outcomes of community capacity building and information literacy programs. Outcomes of the project will contribute to building lifelong learning communities and to increasing skills, innovation and community engagement in rural and regional communities, which are key Federal and Queensland government policies. (ARC Linkage Proposal: Funding Partners Mt. Isa TAFE, State Library of Queensland, Dept. of Communities, and Dept. of Employment and Training)

Camille McMahon & Christine Bruce have recently conducted research which looked at the *Information Literacy needs of local staff in cross-cultural development projects* (McMahon & Bruce, 2002) . Investment in information and communication technologies (ICTs) in developing countries is presented in much of the development literature as a major means of achieving development goals for example (Mansell & Wehn, 1998; United Nations Development Program, 1998). Stakeholders assert that ICTs can have a levelling effect, giving poor communities access to markets, information and other resources otherwise inaccessible (Goldstein & O'Connor, 2000). Attending to information literacy needs and facilitating effective information practices would seem to be a critical component of any development strategy which involves the use of ICTs.

The research question adopted for this study may be stated as follows: What significant differences in perceptions of local workers' information literacy needs exist amongst western development workers? The interest in variation suggested phenomenography as the most appropriate research approach (Marton, 1986).

Research Method: Phenomenography is a research approach that seeks to describe phenomena in the world as others see them, the object of the research being variation in ways of experiencing the phenomenon of interest (Marton & Booth, 1997). A fundamental assumption underlying phenomenographic research is that there is a finite number of qualitatively different understandings of a particular phenomenon. In this research the phenomenon explored was the information literacy needs of local workers in development projects (as understood by the western development workers). In order to elicit perceptions of information literacy needs, semi-structured, in-depth interviews were conducted and transcribed. The focus of the interview questions was not specifically based on ICTs, but on the experiences of the individuals in their various workplace settings.

Outcomes and Application: Five conceptions of information literacy needs were established. They are:

Category 1. Basic Literacy Skills - At the core of this conception of information literacy needs is the need for basic literacy skills.

Category 2. Understanding Workplace Systems - Information literacy needs in this category are understood to be the need to understand the workplace systems in which the local worker – at any level – is working.

Category 3. Communication Skills - At the core of this conception of information literacy needs, and building on the basic literacy skills and understanding of workplace systems, is the need for the local workers to develop communication skills.

Category 4. Accessing Information Sources - The core meaning of information literacy needs within this conception is for the local workers to be able to access information sources.

Category 5. Understanding the Dominant Society - For this conception, information literacy needs are understood to be directly related to the ability to understand the dominant society.

The research findings suggest several considerations that should inform policy and practice within the context of cross-cultural development projects. Firstly a step-by-step approach to meeting Information Literacy needs is appropriate in the cross-cultural context. Second, there is a need for open communication between western project managers and local workers, about broad issues. Third, it is appropriate for local workers to develop an understanding of the broader socio-political context in which they are working. Fourth, information systems should be designed according to the cultural context in which the project is based or alternatively could be established around existing local information structures. Fifth, a broad and systematic approach to facilitating the effective use of information and technology should be a critical component of any development strategy that involves the use of ICTs. Finally, government and non-government organisations including development agencies can look to this research to develop and implement policy aimed at bridging the digital divide, in a manner which maximises opportunities for sustainable project outcomes.

What appears to be the current state of the information literacy research territory?

If we return to the original ideas about the information literacy research territory that we suggested we would explore – it is clear that the sectoral locations of the research are widening, information literacy is being understood more deeply, a broader range of research approaches are being adopted and a wide range of disciplines continues to influence the work. We have some useful examples of investigations conducted in workplace and community settings. Although these remain marginal in number when compared with educationally focussed projects, they are likely to have a powerful impact on our understanding of information literacy. Interest in different cultural settings is emerging, with investigations being considered across cultures, into cultural influences and within culturally specific frameworks, workplaces, people with disabilities etc. Interestingly, a great deal of contemporary work is employing

research approaches that are best described as qualitative, interpretive or even critical in orientation (Figure 2).

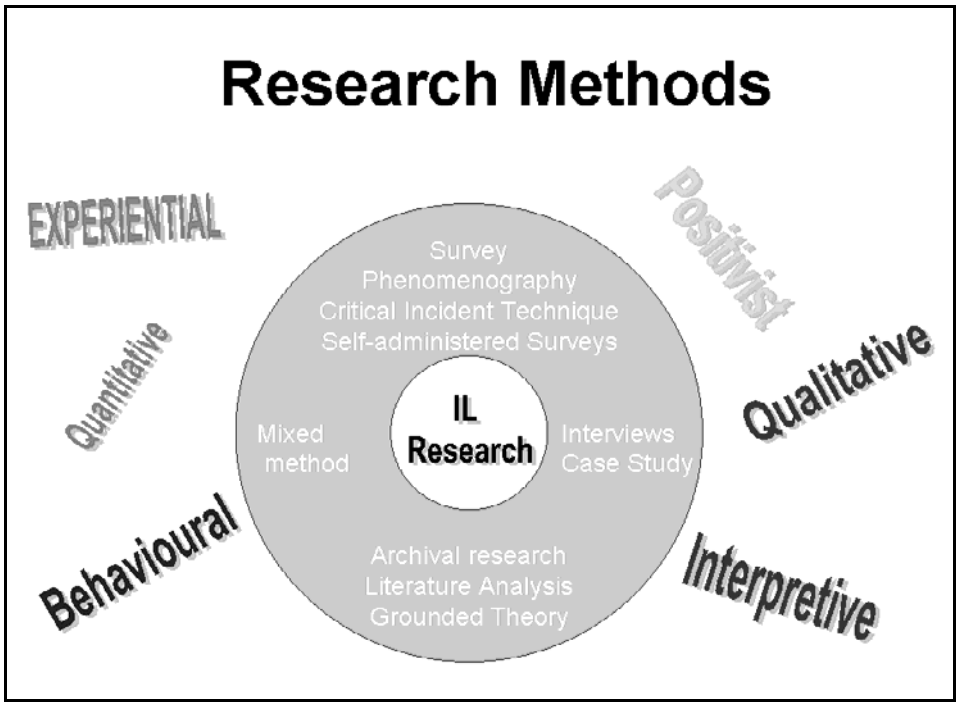

Figure 2: Research Methods in Information Literacy

In terms of the suggested future trajectories, we appear to still have some way to go before we achieve what may be considered features of a maturing research territory. We have achieved limited growth beyond the educational sector and have begun to see attention to a wider variety of cultural settings. In terms of the other trajectories:

- **A firmer more consolidated research agenda** – a number of groups around the world have developed research agendas, most recently the Information Literacy Meeting of Experts. Information literacy researchers need to consider whether this agenda is adopted as a consolidation of previous directions, or whether it becomes yet another of a range of agendas that have been proposed over the years.
- **Greater collaboration between researchers** – there is comparatively little evidence of collaboration across the boundaries of local research groups. More groupings of researchers across institutions, across states and across national boundaries are required.
- **An agenda driven by funding priorities-** funding for information literacy research appears to be an ongoing challenge. The issue is not in itself high on the agendas of funding bodies. Members of the academy seeking research funding are likely to need to align their work to existing priorities, for example e-health or regional communities. The existing agendas appear to be more altruistic than driven by funding priorities. This may be because much research is still being conducted outside the funding framework, largely by research students.

What is the way forward for our research group in the Centre for Information Technology Innovation?

Here in CITI we know that we need strategic alliances, across disciplines, and institutions as well as with industry partners to carry forward the information literacy agenda. We have an embryonic group that is interested in an embryonic research territory. We will need to explore funding opportunities from, not only traditional granting sources, but also from our larger interested organisations – the National Library, State Library, City Councils, TAFE colleges and the like.

Our position is that the information literacy research agenda should be seen as practical and real – it is about real people, doing real things in real life contexts. That is the strength of our research. Our opportunities are waiting to be created and taken.

To achieve this we must work to bring together a research community that is ready to cross boundaries and forge relationships with other groups. We also need to overcome the primary weakness of our current information literacy research agenda – which is that it is set by those devoted to information literacy. Progress will be slow unless we can establish links with the priorities of research funding bodies or we can lobby to influences those priorities.

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Appendix A

Publications from the CITI Research Group

Higher Education Information Literacy

1. Edwards, S. L., & Bruce, C. S. (2004). The assignment that triggered …change : Assessment and the relational learning model for generic capabilities. Assessment & Evaluation in Higher Education, 29(2 Special Issue), 141-157.

2. Edwards, S. L. (in press, 2004). Panning for gold: Understanding students' information searching experiences. In C. Bruce (Ed.), Transforming IT Education: Promoting a culture of excellence. Brisbane: Faculty of Information Technology, Queensland University of Technology.

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